KEITH DOUGLASS WARNER

ARE LIFE PATENTS ETHICAL? CONFLICT BETWEEN CATHOLIC SOCIAL TEACHING AND AGRICULTURAL BIOTECHNOLOGY'S PATENT REGIME

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ABSTRACT. Patents for genetic material in the industrialized North have expanded significantly over the past twenty years, playing a crucial role in the current configuration of the agricultural biotechnology industries, and raising significant ethical issues. Patents have been claimed for genes, gene sequences, engineered crop species, and the technical processes to engineer them. Most critics have addressed the human and ecosystem health implications of genetically engineered crops, but these broad patents raise economic issues as well. The Catholic social teaching tradition offers guidelines for critiquing the economic implications of this new patent regime. The Catholic principle of the universal destination of goods implies that genes, gene sequences, and engineered crop varieties are ineligible for patent protection, although the processes to engineer these should be eligible. Religious leaders are likely to make a more substantive contribution to debates about agricultural biotechnology by addressing these life patents than by speculating that genetic engineering is "playing God."

KEY WORDS: agricultural biotechnology, Catholic social teaching, economic justice, genetically modified food, patents, patents on life, patent regimes, social ethics

In a classic paper published in 1942, the sociologist Robert K. Merton likened the culture of science more to the ideals of communism than to capitalism, because intellectual property was commonly shared and discoveries were freely exchanged. "The scientist's claim to 'his' intellectual 'property,' " Merton wrote, "was limited to that of recognition and esteem," and scientific knowledge was assumed to be a public good (Press and Washburn, 2000).

Located squarely at the intersection between political economy and biotechnological innovation, life patents (patents on life forms) have become an economic lynchpin for the "life industries" as they attempt to profit from engineering novel traits into agricultural germplasm.[1]

[1] Over the past ten years there has been an unprecedented series of mergers between chemical and pharmaceutical corporations, and these have in turn purchased seed companies as part of their competitive strategy. Because they are organized around profiting from the life sciences, they have been called "life industries." Note that these corporations take advantage of a common knowledge base for their pharmaceutical and

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Tremendous expenses are incurred in developing processes and organisms that are relatively inexpensive to reproduce and bring to market. Over the past twenty years, life industry corporations have made unprecedented patent claims over genetic material, and in the US and Europe, public agencies have acceded. Biotech companies have pressured the US and other Northern governments to advocate for international patent agreements, trade related Intellectual Property Rights (IPRs). These have become some of the most contentious issues in international trade, snagging GATT and WTO negotiations, often over the issue of agriculture (Buttel, 2000). Life patents are seen by life industries as pivotal to profiting from agricultural biotechnology. Their importance cannot be overstated. Without the assurance of controlling commercial application, the life industries argue, they could not justify the tremendous capital investments in biotechnology research to their shareholders. Taken together, these new arrangements are the agricultural biotechnology patent regime (the term is from Brown, 2000).[2]

This has begun to prompt criticism from religious leaders (Heinberg, 1999). A group of American religious leaders protested the US Supreme Court decision to permit the patenting of animals in 1987 and said, "The decision of the US Patent Office to allow the patenting of genetically engineered animals presents fundamental dangers to humanity's relationship with the natural world. Reverence for all life created by God may be eroded by subtle economic pressures to view animal life as if it were an industrial product invented and manufactured by humans" (quoted in Bruce and Bruce, 1998, pp. 227–228). In 1999 at a public forum held during Seattle's WTO meeting, Monsignor Oswaldo Neves from the Vatican raised several ethical concerns about the trade related IPR negotiations:

1. They might put a damper on research.
2. Knowledge of agricultural biotechnology may be held in monopoly by the industrialized North.
3. Investors in biotech firms will likely direct its application for profit, not for addressing critical social needs such as hunger.
4. Indigenous knowledge may be "unduly appropriated."

seed divisions, but their marketing and legal strategies for these two products have followed different paths.

[2] Pharmaceutical biotechnology's patent regime significantly overlaps with that of agricultural biotechnology, and taken together, they comprise the life patent regime. Pharmaceutical biotechnology's patent regime also raises serious ethical problems, but these are beyond the scope of this paper.

5. Small farmers may become dependent upon seed companies (Neves, *personal communication*).

Why this concern? What is the theological basis for concern about agricultural biotech IPRs? Why would a representative of the Vatican speak against agricultural biotechnology at a global forum?

Human cloning or biotechnological intervention in human reproduction has been criticized by religious leadership since the invention of this technology, but concern about agricultural biotechnology on religious grounds is only now beginning to be articulated. I would like to explore one aspect of this opposition: patents on life forms and the biotechnology patent regime in which they are embedded. For the purposes of narrowing the focus of my paper, I am going to set aside two significant ethical issues: agricultural biotechnology's potential danger to ecosystem and human health. These ethical issues deserve broader discussion but are beyond the scope of this paper. These subjects will continue to generate debate, but no conclusive regulatory action appears likely in the US unless GMOs are "proven" to negatively impact public health or the environment. I propose that critiquing the patent regime that appears to have accelerated the growth of the life industry (Lesser, 1998) will lay a foundation for embedding this economic activity in social relations (Polanyi, 1957).

I will consider ethical problems with life patents from the perspective of the religious tradition with which I am most familiar, Roman Catholicism. I will apply ethical principles from the body of thought known as Catholic social teaching, initiated in 1893 to address questions of labor and private property but still used as the foundation for addressing many socio-economic issues, from racism to war, economic justice to protection of the environment. During the past few years, there has been a significant rise in popular concern about genetically modified organisms in the agrofood system, and most of the concerns have been about human and ecological health (Buttel, 2000). In general, the faith communities do not have strong traditions of addressing these kinds of issues: officials from the Catholic Church have made statements of philosophical considerations to bring to environmental issues, but these are not sufficiently developed to address newer and more complicated issues such as GMOs. Some churches appear to be ignoring these concerns, participating in demonstrations supporting GMO foods, ostensibly because they create jobs and "feed the hungry" (Petersen, 1999). Religious leaders have speculated that genetic engineering may be "playing God" and inherently wrong (Peters, 1997; Pope John Paul II, 1996; Heinberg, 1999), but even if they were to make definitive pronouncements that this were so, civil authorities would not be likely to ban the technology itself. The Catholic theological tradition balancing

private property and public good is much stronger and better developed, and the Catholic Church would be able to contribute in a substantive way to life patents by drawing on the principle of the universal destination of goods found in its social teaching.

HOW LIFE PATENTS CAME TO BE

Industrial patents were developed during the 19th century as a way of protecting the intellectual property of inventors. Patents were designed as a trade off between society and inventors, in which a monopoly is granted to the inventor in order to promote the common good. To receive a patent, an inventor has to prove that the invention is novel, useful, and non-obvious. National governments granted exclusive rights over the invention to the inventor for a set period of time (generally 15–20 years), with the expectation that this would provide incentive for inventors to continue creating benefits for society. Patent laws written almost two centuries ago have served this purpose well, but the biotechnological revolution presents novel challenges to them. Life patents, preventing others from using germplasm that had been considered from time immemorial a "common good," is one such challenge.

The commodification of agricultural seeds was a critical event establishing the commercial precedent for life patents. Prior to the hybridization of corn in the US during the 1930s, commercial seed companies were marginal to the agricultural economy. With the development of superior seeds that were functionally sterile, seed saving, which had been an on-farm activity, was transformed into a commercial product (Kloppenburg, 1988). From the Plant Patent Act of 1930 through the Plant Variety Protection Act of 1970 to the current configuration of administrative rulings and legal precedents in the US, commercial plant breeders and biotechnology companies have garnered more political and economic power over farmers, smaller breeders, and local seed savers. This has resulted in an expansion of "appropriationism" (Goodman, 1991), wherein formerly on-farm activities are transformed into agri-industrial industrial products that are sold for a profit back to farmers, into the seed industry.

The expansion of economic power for corporations at the expense of farmers is not new, but the biotechnology revolution is accelerating the economic concentration of power over the world's germplasm. The sterility of hybrid corn served as a biological form of property rights protection. This protection attracted private investment because farmers would have to return to seed companies each year to buy the desirable traits. Hybrid corn led the way toward property rights protection and

concentration of economic power: in 1980, the estimated four-firm concentration in corn was 57%, compared to 14% for the rest of the US seed industry (Lesser, 1998). With the expansion of patent systems to include seeds and the techniques to genetically engineer them, life industries now exert an alarming degree of economic power over the world's agricultural future.

Through genetic engineering, seeds have become a technology platform for delivering novel traits to farmers. "Mechanical" agricultural technology, such as harvesting machines or irrigation technology, has revolutionized the rural landscape and social attitudes toward food and agriculture; the biotechnology revolution is posed to bring even more rapid and dramatic change (Buttel, 1990). In countries with industrialized agriculture, seeds have been transformed from a material that was freely traded or purchased for a nominal price 70 years ago into a patented delivery system for biotechnology attacked and defended by transnational corporations, their lawyers, and their private security forces.

Previous laws had provided plant breeders with rights over the reproduction of sexually and asexually reproduced plants, but have been eclipsed by the biotechnology revolution and its patent regime.[3] During the 1980s, several legal developments took place in the US that expanded the scope of patents. In 1980, the US Supreme Court upheld the position of the US Patent and Trademark Office (USPTO) that genetically engineered organisms, in this case a bacterium, could be patented in the now famous *Diamond v. Chakrabarty* decision (Kevles, 1998). In the same year, Congress passed the Bayh-Dole Act, facilitating the commercialization of federally funded research (Lacey, 2000). As a consequence, private industry, especially biotechnology firms, began substantial investments in public university research in the hope of capturing novel inventions and organisms. This law has had its intended effect of increasing funding for research through public-private partnerships, although critics are uneasy over perceived conflicts of interest (Lacey, 2000). The third development was the decision by the USPTO in 1985 to issue utility (industrial) patents for plants. This decision brought the same level of protection to plants, engineered or not, as to industrial inventions. Utility patents can also be much broader because they are not limited to a single variety or cultivar, or even a single species (RAFI, 1995).

Taken as a whole, these legal decisions serve as the foundation for the biotechnology patent regime. In the US, life industries often simultaneously file for patents on different dimensions of their innovation and

[3] Note that there has also been a parallel expansion of conventional plant breeders' rights at the expense of farmers (see RAFI, 1995).

discovery: genes, gene sequences, engineered crop species, and genetic engineering techniques specific to a crop species. This practice is termed "patent stacking." Life industries have generally pursued strategies to acquire the small, innovative start-up companies and to file large numbers of broad patents claims, in the hope of creating significant barriers to entry for other corporations and accelerating the trend toward corporate control of germplasm in the industrial North (Barton, 1999; Lesser, 1998; Meek and Brown, 2000; RAFI, 2000a).

ECONOMIC POWER AND THE PATENT REGIME

Several issues of social ethical concern arise from these events. First, the *Chakrabarty* decision was a decision made by the judiciary. The decision to permit the patenting of life forms did not result from a participatory process, but an administrative decision affirmed by a legal precedent. The decision to permit the patenting of processes was administrative, not legislative. Kevles (1998) suggests that the expansion of patents to life forms took place in the courts because the US Congress declined to engage the issue. As a result of inaction on the part of legislators, patent holders are able to patent the processes that developed a novel product, excluding others from using this knowledge, and prevent others from using the seeds and living organisms themselves. This is the essence of the so-called "negative right" (Hubbel and Welsh, 1998) that concerns even proponents of agricultural biotechnology (Barton, 1999; Spillane, 1999). This process has not been participatory, nor has it been democratic, continuing the trend, at least in the US, toward less popular participation in social decision making about technology as it impacts society (Sclove, 1995; Middendorf et al., 1998).

Second, this novel patent regime has had reverberations in national patent regimes around the world. Aggressive US biotechnology firms were successful in persuading the European Parliament to agree to the patenting of genes in 1998 (Meek and Brown, 2000). Likewise, they have been able to persuade the governments of the industrialized North to press their case in the global trading system (Dawkins, 1997; Buttel, 2000). Critics have charged that this new patent regime will devastate subsistence farmers in the developing world, undercut the food security of many nations, result in further erosion of biological and genetic diversity, and lead to a deterioration of nature-society relations (Dawkins, 1997; Shiva, 1997; RAFI, 1997; McAfee, 1999).

At the heart of this new patent regime has been the approval of patents on genes, gene sequences, gene traits, organisms, and technical

scientific processes to engineer them. On October 27, 1992, Agracetus Inc. received from the USPTO a patent that covers all genetically engineered cotton varieties (USPTO, 1992). This was the first "species-wide" patent, meaning that Agracetus was laying claim to all genetically engineered forms of cotton. According to Agracetus' vice-president of finance, Russell Smestrad, "All transgenic cotton products, regardless of which engineering technique is used, will have to be commercially licensed through us before they can enter the marketplace" (Wrage, 1992). With this patent, Agraceteus garnered the right to decide when and if it chooses to permit others to genetically engineer cotton. Almost 200 million people worldwide derive all or part of their income from growing cotton (RAFI, 1993).

On March 2, 1994, the European Patent Office granted a species-wide patent soybeans to Agracetus, meaning that all forms of genetic engineering on this crop were effectively controlled by this one company, leading to charges that the office had awarded a monopoly (King, 1994). Claim 17 on European Patent 0301 749B1 states: "A soybean seed that will yield upon cultivation a soybean plant comprising in its genome a foreign gene effective to cause the expression of a foreign gene product in the cells of the soybean plant" (quoted in RAFI, 1994). Monsanto's lawyers submitted a 300 page brief to the office in opposition to this patent, claiming it was "obvious," but when Monsanto purchased W. R. Grace's agricultural biotechnology division (including Agracetus), it did an about face and promised to defend it (RAFI, 1998).

In 1993, Calgene was awarded a US patent for any plant in the *brassica* genus (rapeseed, broccoli, cauliflower, cabbage, etc.) genetically engineered using the agrobacterium, and this appears to be the first genus-wide patent (USPTO, 1993). Escagenics has a US patent on all transgenic coffee plants. Groupe Limagrain, based in France, holds a US patent on almost all transgenic melons, and DNA Plant Technology, based in the US, has patented all transgenic pepper plants (RAFI, 1995). These utility patents have raised the stakes substantially. The cost of preparing a patent application in the US ranges from $10–20,000, and one industry observer estimates that the cost of defending a patent approximates $250,000 over the course of the patent's life (RAFI, 1995).

The life industry corporations have staked immense amounts of capital – billions of US dollars – in the development of transgenic crops and the establishment and defense of patents on them. Their investors are now demanding "appropriate" return (Peters, 2000; Benbrook, 2000). This stress is critical to understanding the behavior of these corporations and their advocacy for their patent regime. To recover the substantial research

and development expenses, life industry corporations must do more than discover the gene sequence that governs a trait. They must be able to deliver the trait to farmers through seeds and they want to prevent others from profiting from this technique. To achieve these ends, there has been a remarkable consolidation of seed, agrochemical, and pharmaceutical corporations in the late 1990s: Monsanto had acquired 18 seed companies worth about $8 billion in the US, and a roughly equal set of acquisitions overseas; Novartis was formed by the merging of Sandoz and Ciba-Geigy, and then later merged with AstraZeneca (itself formed by a merger) to form Syngenta, worth some $30 billion; Dupont chose to enter the market through joint ventures instead of mergers, establishing over twenty, and valued at more than $5 billion (Lesser, 1998; RAFI, 2000a).

With more economic resources and greater control of the market, these corporations engage in continuous litigation to defend themselves from competition in segments of the agricultural biotechnology market that they control and to open up new areas of competition currently controlled by other life industries. These segments are often bounded by the configuration of stacked patents, however some broad patent claims have been over-ruled in the courts (Barton, 1999). In addition to suing each other, corporations are now suing farmers that they accuse of saving patented seeds (RAFI, 1999).

Critics of the zeal, speed, and power of the life industries charge that patents on life forms and the context in which they occur, the concentration of corporate power over seed companies, pose serious ethical problems (RAFI, 1995, 1997, 1999). At the global scale, agricultural germplasm had been viewed as the common heritage of humankind until just a few decades ago, but the biotechnology revolution and economic globalization is accelerating a trend away from traditional common property regimes (Brush, 1996). The industrialized North is pressuring countries of the South to abandon these "traditional IPRs" in favor of a patent system that will favor life industries, which will likely result in further eroding rural incomes and livelihoods (RAFI, 1997; McAfee, 1999). In the US, critics have charged that Monsanto has attempted to monopolize the GMO corn and soy markets, and conspired to restrain trade and fix markets in them. The problem of monopoly is nothing new in agriculture, but unlike previous monopolies over land and transportation, we are now witnessing economic control over the reproduction of life itself.

In light of this discussion, the logic of the "Technology Protection System" trait, labeled "Terminator" by critics, makes sense. By splicing genes with a sterility trait into seeds, the US Department of Agriculture (USDA) and Delta & Pine Land scientists would be able to control the

reproduction of seeds through genetic engineering and achieve for life industries the same purpose as broad, utility patents. Critical NGOs such as the Rural Advancement Foundation International have been able to focus the moral outrage of scores of national governments, scientific institutions, and the United Nations against the USDA, which has not repudiated the technology (RAFI, 2000b). It appears that "Suicide Seeds" make an easier target for public outrage than the complex and now institutionally embedded legal system of protection for broad patents.

RELIGION, SOCIAL ETHICS, AND LIFE PATENTS

The vast majority of religious concern over genetic engineering has been directed toward issues of human cloning (Peters, 1997; Heinberg, 1999). Ian Barbour presents a thorough discussion of religious "Ethics in an Age of Technology" (1993), and he even discussed agricultural ethics from a religious perspective, but this work was completed before the biotechnology revolution began to raise ethical concerns. Celia Deane-Drummond (1997) devotes most of her recent work to the theological implications for biotechnology and the scientific implications of biotechnology for theology. She does raise the issue, however, of the likelihood that when applied to agriculture, biotechnology will likely drive a wedge between the rich and the poor. She raises the issue of economic consequences from the perspective of biblical justice, but most popular articulation of religious ethics and agricultural biotechnology has been concerned with intrinsic ethics. Bruce and Bruce (1998) have provided the most thorough discussion of the ethics, religious or otherwise, of agricultural biotechnology to date.

Patents were originally developed to both facilitate free and open access to benefit society and to provide a system of protections to ensure fair reward for those who invent. Proponents of patenting biotechnology argue that while genetic engineering is mostly a biological process, it depends on a critical technical intervention. There is no reason, in the opinion of biotechnology proponents, to ethically justify the prohibition on a patent for this type of invention more than any another (Bruce and Bruce, 1998).

Religious opponents assert that it is intrinsically wrong to patent life for at least two reasons. First, God is the author of life, and it is preposterous for anyone to claim to have invented something that is alive. Engineering two genes out of an organism's entire genome and claiming it to be "novel" would have to be considered a gross exaggeration. From a Christian perspective, human beings are called to be stewards of creation. It may be appropriate to claim patent over the process of modifying a gene in a

transgenic organism, but the recent expansion of patents to include engineered traits and all engineered varieties of a species is too far. To claim a patent over a living organism could amount to some kind of blasphemy or occupying a place properly reserved for God (Bruce and Bruce, 1998). But even if one agreed with this criticism, there would be little social or political recourse to preventing life patents on these grounds.

Second, the patenting of life forms constitutes an unwarranted extension of private ownership because it furthers the process of commodification of life (Bruce and Bruce, 1998). Proponents of biotech patenting argue that the ownership issues are no different than a farmer owning a cow or someone owning a pet, but these analogies are inaccurate. Patenting assures the right to either control or derive financial benefit from all of the patented life forms; it is a much broader sense of ownership. A more accurate analogy would be that of a corporation developing the first mousetrap to sell for a profit, but then suing other corporations for developing all other kinds of devices that trapped rodent pests. Owning a living organism is one issue, but preventing others from owning similar organisms unless they pay the first corporation that developed it – the "negative right" – is another. Patents are a very specialized form of private property, one with a great deal of social power, because the owner has the legal right to prevent others from using it, or to specify conditions or payment from others who want to use it. The legal decisions that have permitted the expansion of this form of private property into germplasm should have been made in the context of a social discussion about the desirability of their impacts (Sclove, 1995; Middendorf et al., 1998). The explosion of life patents should raise ethical concerns because it signals an expansion of this powerful private property protection.

CATHOLIC TEACHING, PRIVATE PROPERTY, AND LIFE PATENTS

Is it ethically acceptable to genetically engineer agricultural crops according to the Catholic tradition? In the fall of 1999, the Pontifical Academy for Life, a Vatican research body released a report on agricultural biotechnology, the most complete discussion of this issue in the Roman Catholic Church to date, and the report was generally favorable (Pontificia Academia Pro Vita, 1999). From their perspective as Catholic legal and medical researchers, genetic engineering of crop plants is not sufficiently different from traditional plant breeding to justify ethical concern.

This report gave "a prudent yes" to the regulated use of agricultural biotechnology.[4]

The Pontifical Academy for Life is a research body, however, and its report does not represent magisterial or official church teaching. Pope John Paul first addressed biotechnology in his 1990 World Day of Peace message:

> (We) can only look with deep concern at the enormous possibility of biological research. We are not yet in a position to assess the biological disturbance that could result from indiscriminate genetic manipulation and from unscrupulous development of new forms of plant and animal life, to say nothing of unacceptable experimentation regarding the origins of human life itself. It is evident to all that in any area as delicate as this, indifference to fundamental ethical norms, or their rejection, would lead mankind to the very threshold of self-destruction (Pope John Paul II, 1996).

While celebrating the "Jubilee of the Agricultural World" in 2000, the Pope re-iterated his concerns: "(Agricultural biotechnology) must be submitted beforehand to rigorous scientific and ethical examination, to prevent them from becoming disastrous for human health and the future of the earth" (John Paul II, 2000). During the same speech, the Pope admitted that "the Church obviously has no 'technical' solutions to offer," and in expressing his concerns for ecosystem and human health, he was only echoing the concerns of millions of people.

Ironically, the Pope and other Church officials have raised questions of biotechnology's scientific impact, but then quickly added that they are not competent to answer these questions; even though the Catholic Church has in its social teaching the best developed tradition of any Christian denomination on economic justice and private property rights, this tradition has not been mobilized on issues of agricultural biotechnology. Monsignor Neves has been the only one to raise the social and economic impacts when he spoke in Seattle at the WTO forum. Let us explore some aspects

[4] The Pontifical Academy for Life wrote this report from their perspective as physicians and lawyers with some theological training. Some of its key conclusions:

- It is licit to genetically modify animals in order to improve human health and living conditions. It is not acceptable to cause suffering to an animal without reason "proportional to its social usefulness." This is a logical extension of the approach in the Catechism of the Catholic Church that is still strongly anthropocentric based on the Aristotelian hierarchy of being.
- The environmental risk of genetic modification of plants should be evaluated on a case-by-case basis.
- As genetically altered foods are put on the market, health effects should be monitored carefully, and consumers should be informed when the foods have been altered. (Catholic News Service, 1999).

of Catholic social teaching to determine what possible relevance they may have to issues of life patents.

Pope Leo XIII initiated Catholic social teaching in 1893 when he wrote *Rerum novarum*, the first official Catholic teaching letter (encyclical) on the social implications of the industrial revolution. Throughout the twentieth century, Popes and other Church leaders have constructed an ethical vision of economic and social life in the industrial and post-industrial age. They have commented on private property, the common good, and economic human rights carefully, bringing ethical principles to public debates about the direction of national and international economies. Even though Church teachings written before genes were discovered may seem irrelevant to debates over biotechnology, Catholic leaders continue to draw on core principles articulated over the past one hundred years as they make comments on contemporary developments.[5]

A Catholic vision of both the common good and private property rights is summed up in the principle of the *universal destination of goods.* Developed by the Second Vatican Council and clarified by the Catechism of the Catholic Church, this principle expresses the belief that the Earth and its goods are "destined" for the entire human race. The purpose of private ownership is to ensure that Earth's goods are made available to all, that their universal destination is achieved (Catechism, 2403–2404). Some have called private property a secondary human right, for it is relative to service of the common good (Kammer, 1991). The foundation for this principle was developed by the first two social encyclicals, *Rerum novarum* and *Quadragesimo anno.* These were written in part to address the issue of private property as socialist thought was swirling through Europe, drawing on Marx to attack the validity of private property. Both encyclicals sought to find a middle ground between the absolute property rights advocated by neo-capitalists and their complete abolition advocated by communists. Private ownership of land and capital was affirmed as a right, but both encyclicals insisted that this right was not absolute (Henriot et al., 1992). There is a social claim upon private property – private property must serve

[5] The US Bishops wrote "Economic Justice For All" in 1986 (USCC, 1986/1996), articulating a moral vision for the US economy. It set off a flurry of complaints from business leaders offended by the "intrusion" of Church leaders into something that the business leaders believed they knew nothing about. Those who were offended did not realize that "Economic Justice For All" affirmed and made specific the principles for a moral vision of economic life that had been developed through Catholic social teaching over the course of the century. "Renewing the Earth: An Invitation to Reflection and Action on the Environment in Light of Catholic Social Teaching" (USCC, 1991) was written to address the religious dimension of environmental problems, and it also drew on Catholic social teaching.

the common good, the well being of all. Private property is understood in the Catholic tradition to be the *means* for achieving the universal destination of goods, not an end in and of itself. Private property systems should be designed to achieve a minimal level of distributive justice. Catholic teachings on economic justice – at the international level, between nations, and at the national level, between individuals and their society – as well as economic human rights are based on this foundational principle.

In recent years, the Church has come to see intellectual property in the same light as other forms of property. Property rights are not absolute: they exist to facilitate the just distribution of the world's goods. Pope John Paul II made it clear that intellectual property and knowledge must be seen in the same light as other forms of private property.

> [The Church] has consistently taught that there is a "social mortgage" on all private property, a concept that today must also be applied to "intellectual property" and to "knowledge." The law of profit alone cannot be applied to that which is essential for the fight against hunger, disease and poverty (Pope John Paul II, 1999).

Systems of private property are to help distribute the gifts of the earth, and it is morally unacceptable to hoard. Hungry, ill, and poor persons have a social claim to access the benefits derived from knowledge and its development. From this review of Catholic social teaching, we can conclude that patents are acceptable as long as they are consistent with the distributive justice goal of all private property.

IMPLICATIONS OF THE UNIVERSAL DESTINATION OF GOODS FOR LIFE PATENTS

The principle of universal destination of goods has implications for patents on life at different scales. At the international or global scale, traditional farming strategies must be protected from predatory practices by transnational life industries. The Catholic belief in the common good should be expressed in explicit support for the world's germplasm as the common heritage of humankind. The world's agricultural germplasm is the product of thousands of years of collective invention, building on biological diversity with cultural creativity. These cannot be dissected. Yet, as Kathy McAfee (1999) explains, transnational corporations and the Northern governments advocating the World Trade Organization approach to trade related IPRs argue that global genetic resources are the common heritage of humankind when they are prospecting them but become proprietary when they are "finished off" by genetic engineering in a laboratory. This approach would only exacerbate existing international economic injustice.

Steven Brush (1996) suggests several implications of the common heritage principle: a person or group joining the stream of plant husbandry cannot monopolize access to pre-existing genetic resources; persons or groups cannot restrict access to collective inventions of others; this principle necessarily implies a reciprocity between the initial developers of the genetic resources and those further improving them. These values are suffering erosion under the trade related IPRs promoted by advocates for neo-liberal globalization.

Indeed, traditional plant breeders' rights are already being eroded by the practices of "bio-prospectors" or "bio-pirates" (the choice of term depends on one's perspective). Private corporations take crop seed that has been developed over millennia through traditional breeding, patent it, and then profit from its sale, or in some cases, aggressively market it to farmers in its country of origin (RAFI, 1997, 1998; Shiva, 1997; Teitel and Shand, 1997). Over 1.4 billion people depend on traditional plant breeding to provide seed for their subsistence farming, and many of these are among the world's poorest people. The commercialization of germplasm in the developing world threatens the economic viability of these breeders and the farmers that depend upon them because the genetic diversity upon which they depend has always been reduced by industrialization and commodification. Failing to compensate the cultures and nations that have worked for millennia to develop crop plants through traditional breeding is, in effect, to violate the Seventh Commandment. In this context, principles of economic justice favor the protection of indigenous knowledge, collective cultural invention and the common-heritage approach to innovative development of crops (see Brush, 1996; GRAIN, 1998).

Assuming that it is indeed possible to engineer desirable traits into crop plants without impacting human or ecosystem health, the fruits of this kind of research and investment should be made available to benefit the common good. From a Catholic perspective, national patents should be guided by the same principles as the Church's teaching on conventional property rights, striking a balance between providing distributional justice and rewarding enterprise. Yet the growing scope of US and European patents over the past twenty years seems as novel as the organisms being engineered. To claim proprietary rights over all genetic engineering of an entire crop species contradicts the principle of the common good. Claiming exclusive rights over a gene sequence or even a gene appears to unacceptably favor the inventor (or more properly: discoverer) over the needs of society. Even proponents of agricultural biotechnology observe that the new patent regime has fueled the concentration of the industry that threatens to put a damper on research, diminishing the ability of agricul-

tural biotechnology to bring its promised benefits (Barton, 1999; Spillane, 1999). Barton (1999) argues that the new patent regime has been more effective at restricting competition in the industry than it has encouraging research.[6]

Is it ethically acceptable to patent genes? The biotechnology patent regime implies that exclusive ownership of genes is an acceptable trade-off for the supposed incentive it provides for innovation. From a Catholic perspective, patenting any genetic material is inherently problematic because it involves the intrusion of a private property into resources that were intuitively common property regime until just a few years ago.[7] In this regard, life patents are inherently different than patents on inventions or industrial products and processes because they intrude on existing systems of common heritage property rights (Brush, 1996). In addition, no one can claim to have "invented" genes, gene sequences, or germplasm. Genetic engineering does not actually engineer the genes, but rather the gene sequence so as to produce useful traits. I propose that a balance can be struck by distinguishing between the "invention," or technical process, and the germplasm itself. The traits of gene sequences are better understood as discoveries, not inventions, and therefore ineligible for patent protection. The discovery of technology to engineer gene sequences and the technical scientific knowledge is appropriate for patent protection. Patents on life forms, germplasm, gene sequences, and genes are not. From a Catholic perspective, the biotechnology patent regime must be reigned in and re-situated in the moral economy (Polanyi, 1957). At this time, advocating a prohibition on the patenting of life may seem quixotic, but two hundred years ago, so too did the movement to abolish slavery.

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[6] Barton (1999) makes three recommendations for correcting the patent regime so as to reverse the trend toward oligopoly: (1) a stronger non-obviousness principle; (2) limiting the scope of patent claims; (3) approving patents for individual methods of genetically engineering desirable traits but excluding claims over fundamentally different methods to engineer traits on the same plants.

[7] The Pontifical Academy for Life (1999) does not come to this conclusion. Its report apparently did not consider the economic justice implications of the genetic revolution, perhaps because Italy has one of the more conservative patent systems in Europe. It only recommends that when awarding patents, "a distinction should be made between what is found in nature and what is specifically designed for commercial sale" (Catholic News Service, 1999). It is difficult to understand how the Academy could justify this statement, for in the context of the new patent regime innumerable patents have been awarded for objects found in nature, which are in turn sold commercially. Genetic engineering does not actually create new genes, of course. In fact, genetic engineering does not actually engineer genes themselves, but rather their sequencing. All the genes in transgenic organisms are found in nature, at least somewhere, in some sequence.

CONCLUSION

The unprecedented expansion of life patents raises troubling issues in social ethics. The privatization of germplasm formerly considered the common heritage of humankind is incompatible with notions of the common good and economic justice. The scrutiny that life industries have been receiving is well deserved, although most of this attention has been focused on the potential threats to human and ecosystem health. The economic implications of the biotechnology patent regime are less obvious because they do not impact individuals, but rather social groups. The pubic appears less interested in this dimension of the biotechnology revolution. Nevertheless, addressing this patent regime through the lens of the common good is a better strategy for critics of agricultural biotechnology, who will likely be more successful in slowing down the expansion of corporate control over germplasm by addressing economic issues.

Religious ethics can play a more constructive role in the debate over agricultural biotechnology by addressing this patent regime rather than raising questions about "playing God" through genetically engineering germplasm, questions that are hard to answer and unlikely to be resolved in industrial societies. The Catholic social teaching tradition and its principle of the universal destination of goods fundamentally conflicts with the negative right conferred by gene patents. The Catholic principle of the universal destination of goods implies that genes, gene sequences, and engineered crop varieties are ineligible for patent protection, although the processes to engineer these should be eligible. International issues of economic justice and concern for the common good must be brought to the debate over the deployment of agricultural biotechnology. Banning life patents would advance these principles.

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Department of Environmental Studies
University of California Santa Cruz
Santa Cruz, CA 95064
USA
E-mail: keithdw@cats.ucsc.edu